A scalable implementation of metrics-based sustainability evaluation in agricultural field operations: ADAPT and the FieldToMarket API

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Consumers are increasingly concerned about the sustainability of production agriculture. This translates into a growing mandate for growers to improve and document the sustainability of their field operations. It also provides both opportunity (a product from a well-documented, more sustainable operation is expected to sell better than one perceived as less sustainable) and a burden (the data-intensive management of a sustainability evaluation framework).

Improvement requires an objective baseline against which growers can compare the effects of their production practices. Metrics-based sustainability evaluation methods, such as the Field To Market® Alliance's Fieldprint®, provide this: the *Fieldprint* for a field or paddock encapsulates a set of metrics that describe the use of resources such as water, carbon, energy, and soil on that field. It can be compared with aggregated (e.g., local, regional) averages, used to drive what-if scenarios, and thus support sustainability-aware decision-making. While this approach does not currently incorporate every known factor of the sustainability of an enterprise (e.g., social impact), it does provide a framework where different sustainability factors can be evaluated using scientific principles, where evaluation methods can be discussed and updated over time, and where the number of evaluated factors can be expanded as objective methods are developed.

The second aspect of the grower mandate (documentation) is strongly tied to usability and scalability. Widespread implementation of a metrics-based approach is contingent on the solution being easy to use by busy growers. Given that Fieldprint evaluation is a data-intensive process, it makes sense to incorporate it into the grower's regular business workflow in a way that minimizes extra data entry. The grower's own Farm Management Information System (FMIS) enables extracting value from field operations recordkeeping in multiple ways, so it becomes a natural candidate to house Fieldprint evaluations. Scalability requires simple, cost-effective solutions that can be easily adopted by FMIS companies

This paper describes an implementation approach based on combining the Field to Market Application Programming Interface (API, a standardized, extensible way of delivering the fieldprint calculation algorithms) with the common object model and plug-in architecture of AgGateway's Ag Data Application Programming Toolkit (ADAPT, an open-source industry framework of data conversion tools developed to enable interoperability among different equipment and software systems). By leveraging both the Field to Market API and ADAPT (which FMIS companies have multiple motivations to integrate with), farm management information systems can scalably provide growers with a user-friendly framework to rapidly evaluate and improve the sustainability of their operations.

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